

EOS Mission Support Network Performance Report

This is a monthly summary of EMSnet performance testing -- comparing the measured performance against the requirements. Currently using updated BAH requirements (Feb '03), including missions through 2006.

All results are reported on the web site:

http://netstats.eos.nasa.gov/performance/Net_Health/EMSnet_list.html.

Note the new web page URL!!!!

It shows MRTG-like graphs of the performance to various test sites, including thruput, RTT, packet loss, and hops, with 1 week, 2 month and 6 month graphs. (The old URL will continue to work for a while too).

Highlights:

- Most test results were stable.
- Rating for US → NASDA remains low due to the inclusion of 4 ISTs for AMSR-E into the requirement. Note: this is possibly an excessive requirement.
- JPL EMSnet PVC from LaRC implemented; further changes still in progress; LaRC → MISR flow moved onto this circuit.
- The "discount" taken on MRTG readings to account for protocol overhead (TCP and IP) was reduced from 10% to 5%. This increased the "User Flow" values somewhat.
- New improved EMSnet performance web site is under development -- try it out: <http://ensight.eos.nasa.gov/Networks/emsnet/index.html>

Ratings:

Rating Categories:

Excellent: Total Kbps > Requirement * 3
Good: $1.3 * \text{Requirement} \leq \text{Total Kbps} < \text{Requirement} * 3$
Adequate: Requirement < Total Kbps < Requirement * 1.3
Low: Total Kbps < Requirement.
Bad: Total Kbps < Requirement / 3

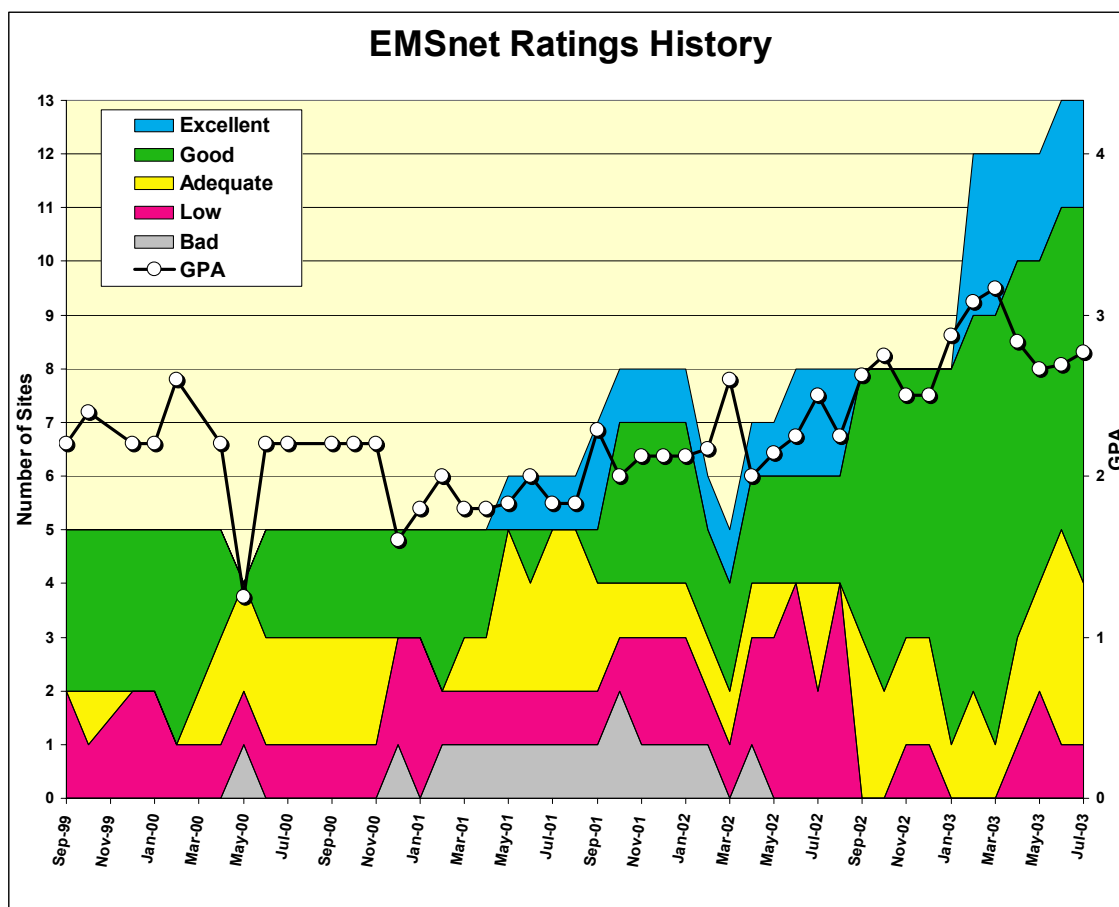
Where Total Kbps = User Flow + iperf monthly average

Upgrades: ↑

NASDA → US: Adequate → **Good**

Downgrades: ↓: None

The chart below shows the number of sites in each classification since EMSnet testing started in September 1999. Note that these ratings do NOT relate to absolute performance -- they are relative to the EOS requirements. The GPA is calculated based on Excellent: 4, Good: 3, Adequate: 2, Low: 1, Bad: 0

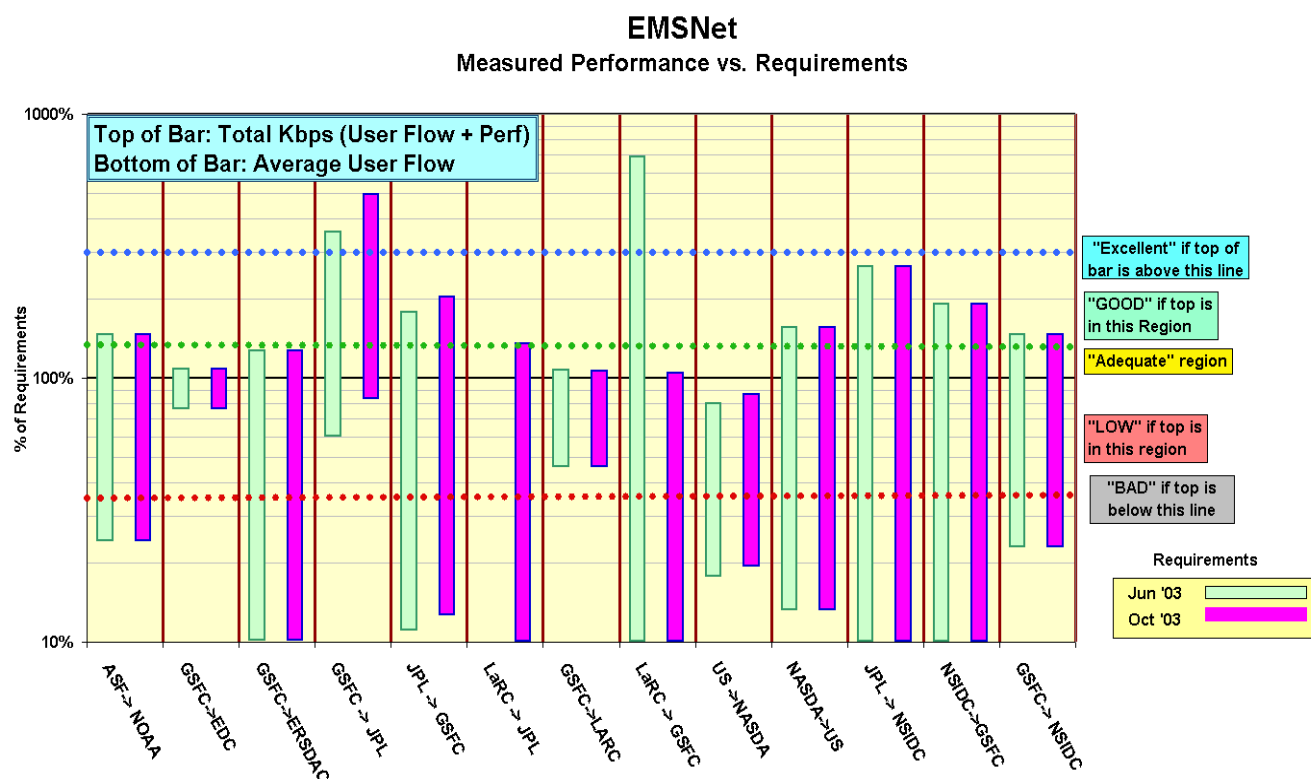


EMSnet Sites: Network Requirements vs. Measured Performance

July 2003		Requirements (kbps)		Testing								
Source -> Destination	Team (s)	Current	Future	Source Node : Test Period	Raw MRTG	Perf -> MRTG	Avg User Flow kbps	Perf Avg kbps	Total Avg kbps	Current Status re	Prev Stat	Current Status re
		Jun-03	Oct-03							Jun-03		Oct-03
ASF-> NOAA	ADEOS II	1864	1864	ASF->NESDIS: 28-May-03 - 31-Jul-03	542	67	448	2276	2723	GOOD	G	GOOD
GSFC->EDC	MODIS, LandSat	216574	216574	DOORS-EDCTest: 01-Jun-03 - 31-Jul-03	174000	1177	164123	70750	234873	Adequate	A	Adequate
GSFC->ERSDAC	ASTER	664	664	GDAAC: 03-Jan-03 - 31-Jul-03	77	6	67	779	845	Adequate	A	Adequate
GSFC -> JPL	ASTER, QuikScat, MLS, etc.	1810	1300	CSAFS: 16-Jun-03 - 31-Jul-03	1249	105	1081	5395	6476	Excellent	E	Excellent
JPL -> GSFC	ADEOS II, AMSR, etc.	5385	4693	JPL -> GSFC: 13-Jan-03 - 31-Jul-03	747	117	592	8978	9571	GOOD	G	GOOD
LaRC -> JPL	TES	30585	30585	LDAAC: 24-Jun-03 - 31-Jul-03	1442	335	1035	40224	41259	GOOD	G	GOOD
GSFC->LARC	CERES, MISR, MOPITT	52446	52664	GDAAC: 18-Jun-03 - 30-Jun-03	25700	268	24147	32113	56260	Adequate	A	Adequate
LaRC -> GSFC	MODIS, TES	6777	44795	LDAAC --> GDAAC: 17-Jun-03 - 31-Jul-03	988	385	554	46188	46741	Excellent	E	Adequate
US ->NASDA	QuikScat, TRMM, AMSR	2856	2623	CSAFS: 23-Aug-02 - 31-Jul-03	562	29	505	1775	2280	LOW	L	LOW
NASDA->US	AMSR	1559	1559	NASDA->JPL-SEAPAC: 06-Jul-03 - 31-Jul-03	265	47	205	2224	2429	GOOD	A	GOOD
JPL -> NSIDC	AMSR	1540	1540	JPL: 13-Jan-03 - 31-Jul-03	174	33	132	3964	4097	GOOD	G	GOOD
NSIDC->GSFC	MODIS, ICESAT, QuikScat	8313	8313	NSIDC -> GDAAC: 23-Oct-02 - 31-Jul-03	411	130	260	15648	15908	GOOD	G	GOOD
GSFC-> NSIDC	MODIS, ICESAT, QuikScat	38234	38234	GDAAC: 01-May-03 - 31-Jul-03	9557	394	8685	47336	56021	GOOD	G	GOOD
Notes:		All flow requirements listed are the greater of inflow or outflow								Ratings		
		Flow Requirements (from BAH) include TRMM, Terra , Aqua, QuikScat, ADEOS II								Summary	Jun-03	Req
										Score	Prev	Oct-03
*Criteria:	Excellent	Total Kbps > Requirement * 3								Excellent	2	2
	GOOD	1.3 * Requirement <= Total Kbps < Requirement * 3								GOOD	7	6
	Adequate	Requirement < Total Kbps < Requirement * 1.3								Adequate	3	4
	LOW	Total Kbps < Requirement								LOW	1	1
	BAD	Total Kbps < Requirement / 3								BAD	0	0
Change History:		27-Sep-99	Original - TRMM, Terra, and QuikScat							Total	13	13
		19-Jan-01	Incorporated BAH requirements including additional missions									
		9-Apr-01	Updated BAH requirements									
		4-Jun-01	Added 50% contingency to BAH requirements							GPA	2.77	2.69
		16-Nov-01	Added MRTG to lperf, updated requirements, Revised criteria									
		2-Oct-02	Updated to revised BAH requirements									
		7-Mar-03	Updated Requirements, Added tests to GSFC, improved User flow calculation									

Comparison of measured performance with Requirements:

This graph shows two bars for each source-destination pair. Each bar uses the same actual measured performance, but compares it to the requirements for two different times (June '03, and Oct. '03). Thus as the requirements increase, the same measured performance will be lower in comparison.



Note: this chart shows that the performance to most sites is remarkably close to requirements. In the past, some sites have had performance way above the requirements, others way below.

Also note that the interpretation of these bars has changed from Sept '01. The bottom of each bar is the average measured MRTG flow to that site (previously daily minimum). Thus the bottom of each bar can be used to assess the relationship between the requirements and actual flows. Note that the requirements include a 50% contingency factor above what was specified by the projects, so a value of 66% would indicate that the project is flowing as much data as requested.

Details on individual sites:

1) ASF ↔ CONUS:

Rating: Continued **Good**Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/ASF-EMS.html

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
ASF → NESDIS	2.60	2.28	0.46	0.45	2.72
ASF → GSFC-CSAFS	2.65	2.29	0.65		
ASF → JPL-SEAPAC	2.80	2.61	1.30		
GSFC-CSAFS → ASF	2.77	2.68	1.06	40	

Requirements:

Source → Dest	FY	mbps	Rating
ASF → NESDIS	'03, '04	1.86	Good

Comments: The 2.7 mbps total from ASF → NOAA is very good for a 2 * T1 (3.1 mbps) circuit. Since this is more than 30% over the June '03 requirement, the rating remains "Good".

2) GSFC → EDC:

Rating: Continued **Adequate**Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/EDC.html

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
DOORS → EDC Test	186.0	70.8	44.4	164.1	234.9
DOORS → EDC DAAC	152.0	55.7	33.0		
G-DAAC → EDC DAAC	84.8	30.6	14.8		

Requirements:

Date	mbps	Rating
April, Oct '03	216.6	Adequate

Comments: The three test cases above continue to show the effects of the DAAC firewalls: the test shown on the top row has no firewalls in the path, just vBNS+. The next test goes through the EDC firewall to the ECS DAAC, and the last test goes through both the GSFC and EDC firewalls. From these values, it does not appear that the EDC firewall has much of an effect on thruput, but the GSFC firewall does. Note that the GDAAC has been sending out an average of over 200 mbps for the past month, much of it to EDC.

This month the MRTG value increased about 10 mbps (but the "User Flow" value used increased another 10 mbps, due to the revised discount protocol overhead). The corresponding thruput tests decreased, but only by 1.5 mbps, for an increase in the total of about 17 mbps. The combined MRTG + thruput remains above the June and Oct '03 requirement, so the rating remains "Adequate".

3) JPL:

Ratings: GSFC → JPL: Continued **Excellent**
 JPL → GSFC: Continued **Good**
 LaRC → JPL: Continued **Good**

Web Pages:

http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-PODAAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-TES.html

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC-CSAFS → JPL-SEAPAC	6.09	5.39	2.29	1.08	6.47
LaRC DAAC → JPL-TES	40.53	40.22	26.57	1.04	41.26
JPL-PODAAC → GSFC DAAC	11.53	8.98	4.86	0.59	9.57

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → JPL combined	Dec '02, Oct '03	1.61, 1.30	Excellent
JPL → GSFC combined	Dec '02	4.86	Good
LaRC DAAC → JPL-TES	Oct '03	30.6	Good

Comments:

GSFC → JPL: The GSFC-JPL requirement above was revised in August '02 to include all flows on the GSFC-JPL circuit, including flows from LaRC and flows to NASDA and ASF. The rating was previously based on testing via EMSnet from CSAFS at GSFC to SEAPAC at JPL. Note that the user flow value above also includes these flows.

Performance on this circuit has been mostly stable since the BOP switchover on 15 August '02. However, on 16 June 2003, performance from MTSV1 to JPL PODAAC, and from G-DAAC to JPL-TES dropped and became noisier. (For example, from MTSV1 to PODAAC, the median dropped from 5.8 mbps to 2.8). However, the GSFC-CSAFS → JPL-SEAPAC results above (still stable) shows that the problem is not in EMSnet.

LDAAC → JPL-TES: Performance from LDAAC to JPL-TES has been very stable since it improved from 2.9 to 6.0 mbps on Aug 15, due to BOP. In order to meet the new 30 mbps requirement for this flow beginning in June '03, the PVC was increased on 17 June, and again on 23 June. The performance shown above reflects the circuit after the 23 June upgrade. The 40 mbps thruput rates as "Good" vs. the 30 mbps requirement. Note: the LDAAC to MISR flow is planned to be migrated to this circuit in July.

JPL → GSFC: Also now being tracked is the requirement from JPL to GSFC. It includes flows from NASDA and ASF which go via JPL, and includes GSFC and NOAA destinations. The combined Dec. '02 requirement is 4.86 mbps, and the thruput (9.57 mbps) is more than 30% above that, so the rating remains "Good".

4) NSIDC:

Ratings: GSFC → NSIDC: Continued **Good**
 NSIDC → GSFC: Continued **Good**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/NSIDC-EMS.html

GSFC ↔ NSIDC Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC-DAAC → NSIDC	88.0	47.3	21.7	8.7	56.0
NSIDC → GSFC-DAAC	16.6	15.6	8.8	0.26	15.9

Requirements:

Source → Dest	Date	mbps	Rating
GSFC → NSIDC	April, Oct '03	38.2	Good
NSIDC → GSFC	'03, '04	8.3	Good

Comments:

Performance from GSFC to NSIDC and from NSIDC to GSFC remains steady, with the ratings for both FY '03 and '04 remaining "Good".

Other Testing:

Source → Dest	Medians of daily tests (mbps)			Requirement	Rating
	Best	Median	Worst		
JPL → NSIDC-SIDADS	5.58	3.96	3.07	1.54	Good
GSFC-ISIPS → NSIDC	7.39	6.85	6.69		
LDAAC → NSIDC	6.04	6.03	4.76	0.07	Excellent

Comments:

JPL → NSIDC-SIDADS: Performance has been very steady from JPL since the Aug '02 BOP switchover, exceeding the modest requirement.

GSFC-ISIPS → NSIDC: Testing is ftp pulls by NSIDC from ISIPS. Performance is very steady at 7 mbps, apparently limited by ftp window size. Manual testing using iperf between the same machines in the same direction gets over 20 mbps.

LDAAC → NSIDC: Thruput from LDAAC to NSIDC increased from about 4.5 mbps (had been steady since 28 November) to 6 mbps on July 11. The very low requirement produces a rating of "Excellent".

5) GSFC ↔ LaRC:

Ratings: GDAAC → LDAAC: Continued **Adequate**
 LDAAC → GDAAC: Continued **Excellent**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/LARC.html

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
GDAAC → LDAAC	56.7	32.1	12.6	24.1	56.3
LDAAC → GDAAC	51.0	46.2	16.8	0.6	46.7

Requirements:

Source → Dest	Date	mbps	Rating
GDAAC → LDAAC	Apr, Oct '03	52.7	Adequate
LDAAC → GDAAC	Apr '03	6.8	Excellent
LDAAC → GDAAC	Oct '03	44.8	Adequate

Comments: Performance from GSFC dropped noticeably on 18 June, when the circuits were reconfigured: the peaks dropped from 88 to 57 mbps, but the median stayed almost the same. Since then there has been a slow general degradation -- possibly due to increasing outflow from GDAAC (the median was 45 mbps last month). The User flow value increased from 9.3 mbps last month. However, this was due to the correction of an MRTG setting which had erroneously limited the value reported. The combined thruput is still above the June and Oct. '03 requirement, but not with a 30% margin, so the rating remains "Adequate".

The LaRC → GSFC performance remains "Excellent", by FY '04 it is planned to backhaul all LaRC science outflow via GSFC, greatly increasing this requirement. The circuit was upgraded to meet this requirement on 18 June -- median thruput was 24 mbps prior to that. The Oct '03 rating therefore remains Adequate.

6) GSFC → ERSDAC:

Rating: Continued **Adequate**

Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/ERSDAC.html

Test Results:

Source → Dest	Medians of daily tests (kbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC → ERSDAC	801	779	428	55	834

Requirements:

Source → Dest	FY	kbps	Rating
GSFC → ERSDAC	'03, '04	664	Adequate

Comments: Thruput since June '02, using the 1 mbps ATM connection had been very stable (except for a problem period from 12 November '02 to 3 Jan '03). The user flow increased slightly this month, and iperf was stable. The total is a bit below 30 % over the requirement, so the rating remains "Adequate".

7A) US → NASDA:Rating: Continued **Low**Web Page: http://corn.eos.nasa.gov/performance/Net_Health/files/NASDA-EMSnet.html

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
GSFC-CSAFS → NASDA-EOC	2.15	1.78	0.51	0.50	2.28
ASF → NASDA-EOC	2.24	1.92	0.54		

Requirements:

Source → Dest	FY	mbps	Rating
GSFC → NASDA	Dec '02	2.86	Low
GSFC → NASDA	Oct '03	2.62	Low

Comments: Performance steady -- about as expected for the 3 mbps ATM PVC (using multiple TCP streams to mitigate TCP window size limitation at NASDA). Results from ASF to NASDA were slightly better than from CSAFS. The requirements above include 4 ISTs at NASDA for AMSR-E. Each IST has a requirement for 311 kbps, for a total increase of 1244 kbps. This requirement causes the rating to be "Low", even though the performance was stable. It could be questioned whether NASDA intends to operate all four of the ISTs simultaneously, or whether some ISTs are backups, in which case the network requirements would be reduced to a value attainable with the current circuit.

7B) NASDA → US:Rating: ↑ Adequate → **Good**

Web Pages: http://corn.eos.nasa.gov/performance/Net_Health/files/JPL-SEAPAC.html
http://corn.eos.nasa.gov/performance/Net_Health/files/GSFC-SAFS.html

Test Results:

Source → Dest	Medians of daily tests (mbps)			User Flow	TOTAL
	Best	Median	Worst		
NASDA-EOC → JPL-SEAPAC	2.24	2.22	0.69	0.20	2.43
NASDA-EOC → GSFC-CSAFS	1.28	1.24	0.57		

Requirements:

Source → Dest	FY	mbps	Rating
NASDA → US	'02, '03	1.56	Good

Comments: Performance continues stable on the new circuit. A gap in testing from NASDA occurred from 20 June until July 6. Performance was similar to previous levels, but the median was slightly higher, increasing the rating to "Good".

A slight decrease in performance to GSFC-SAFS was observed on July 17 -- peaks were typically 1.4 mbps before that (the median and worst were stable).

Note: NASDA has not yet implemented testing with multiple tcp streams. So performance to GSFC is limited by the TCP window size on NASDA's test machine, in conjunction with the long RTT. Therefore, in order to reflect the actual capability of network, the rating is derived from testing from NASDA to JPL. This test uses the same Trans-Pacific circuit, but has a shorter RTT, so will not be as severely limited by the TCP window size. The Trans-Pacific circuit connects into the higher speed domestic EMSnet at JPL, which is not expected to be the limiting factor.